

CLAIMS

What is claimed is:

1. A system for facilitating diagnosis and maintenance of electronic control networks, comprising:

a wireless diagnostic device, said wireless diagnostic device comprising a transmitter and receiver for communicating over a wireless communication channel with a control network via a control network wireless interface; and

at least one wireless ground station, said at least one wireless ground station comprising a ground station receiver attuned to said wireless communication channel, whereby transmitted messages between said wireless diagnostic device and the control network over said wireless communication channel are monitored.

2. The system of claim 1, further comprising a memory storage device connected to said at least one wireless ground station, for storing transmitted messages monitored by said wireless ground station over said wireless communication channel.

3. The system of claim 1, further comprising at least one user terminal connected to said wireless ground station, said user terminal comprising a graphical display whereby information relating to said transmitted messages is displayed.

4. The system of claim 3, wherein said user terminal comprises a user interface and wherein said wireless ground station comprises a ground station transmitter.

5. The system of claim 4, whereby instructions regarding diagnostic or test procedures are transmitted by said ground station transmitter over said wireless communication channel in response to commands entered via said user interface.

6. ~~The system of claim 4, whereby an instruction to terminate a diagnostic session is transmitted by said ground station transmitter over said wireless communication channel in response to a command entered via said user interface.~~

7. The system of claim 1, further comprising a diagnostic and maintenance information database connected to said at least one ground station, whereby information relating to said control network may be retrieved in response to a remote request received from said wireless diagnostic device.

8. The system of claim 7, wherein said information relating to said control network comprises graphical information relating to said control network, said graphical information being displayed on a screen display at said wireless diagnostic device.

9. ~~The system of claim 1, wherein said wireless diagnostic device comprises a graphical display device connected to a wireless intermediary unit, said wireless~~

intermediary unit containing said transmitter and receiver for communicating over said wireless communication channel with said control network.

9 10. The system of claim 1, wherein said wireless diagnostic device is configured to transmit, in response to an entered command, a forced output instruction to said control network over said wireless communication channel, and wherein said control network is configured to respond to said forced output instruction by selecting values for one or more inputs to a controlled electronic circuit such that an output of a control network element is forced to a predetermined state, in the absence of a fault condition.

11. A method, comprising the steps of:

transmitting messages between a wireless diagnostic device and a control network over a wireless communication channel for the purpose of testing or diagnosing said control network; and

monitoring the transmitted messages at a wireless ground station, said wireless ground station comprising a ground station receiver attuned to said wireless communication channel.

12. The method of claim 11, further comprising the step of storing, in a memory storage device connected to said wireless ground station, transmitted messages received by said wireless ground station.

a plurality of wireless ground stations, at least one of said wireless ground stations comprising a receiver attuned to said wireless communication channel whereby transmitted messages between said wireless diagnostic device and the control network are monitored;

5 a ground station interface connected to said plurality of wireless ground stations;
and

a local area computer network connected to said ground station interface, said local area computer network comprising one or more user terminals, said one or more user terminals each comprising a screen display whereby information relating to said transmitted messages may be displayed.

21. The diagnostic and maintenance system of claim 20, wherein said wireless diagnostic device comprises a graphical display device connected to a wireless intermediary unit, said wireless intermediary unit containing said transmitter and receiver for communicating over said wireless communication channel with said control network.

11 22. The diagnostic and maintenance system of claim 20, further comprising a memory storage device connected to said local area computer network, for storing transmitted messages monitored by said at least one wireless ground station over said wireless communication channel.

~~12~~ 23. The diagnostic and maintenance system of claim ~~20~~¹⁰, whereby instructions regarding diagnostic or test procedures are transmitted by said at least one ground station over said wireless communication channel in response to commands entered via said user interface.

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~~13~~ 24. The diagnostic and maintenance system of claim ~~20~~¹⁰, whereby an instruction to terminate a diagnostic session is transmitted by said at least one ground station over said wireless communication channel in response to a command entered via said user interface.

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~~25.~~ The system of claim 20, further comprising a diagnostic and maintenance information database connected to said local area computer network, whereby information relating to said control network may be retrieved in response to a remote request received from said wireless diagnostic device.

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26. The system of claim 25, wherein said information relating to said control network comprises graphical information relating to said control network, said graphical information being displayed on a screen display at said wireless diagnostic device.

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27. A diagnostic and maintenance system, comprising:
a plurality of wireless diagnostic devices, each comprising a transmitter and receiver, said wireless diagnostic devices communicating over a plurality of wireless communication channels with one or more control networks, each of said wireless

13. The method of claim 11, further comprising the step of displaying information relating to said transmitted messages on a graphical display of a user terminal connected to said wireless ground station.

5 14. The method of claim 13, further comprising the step of transmitting instructions regarding diagnostic or test procedures by said ground station over said wireless communication channel in response to commands entered via a user interface at said user terminal.

10 15. The method of claim 13, further comprising the step of transmitting an instruction to terminate a diagnostic session from ground station over said wireless communication channel in response to a command entered via a user interface at said user terminal.

15 ~~16. The method of claim 11, further comprising the step of retrieving, in response to a remote request received from said wireless diagnostic device, information relating to said control network from a diagnostic and maintenance information database connected to said ground station.~~

20 17. The method of claim 16, wherein said information relating to said control network comprises graphical information relating to said control network, said method

further comprising the step of displaying said graphical information on a screen display at said wireless diagnostic device.

18. The method of claim 11, wherein said step of transmitting messages between said wireless diagnostic device and the control network over said wireless communication channel comprises the steps of transmitting messages between a wireless intermediary unit and the control network over said wireless communication channel, said wireless intermediary unit connected to a graphical display device.

19. The method of claim 11, further comprising the steps of:
transmitting from said wireless diagnostic device, in response to an entered command, a forced output instruction to said control network over said wireless communication channel;

receiving said forced output instruction at said control network; and

in response to said forced output instruction, selecting values for one or more inputs to a controlled electronic circuit such that an output of a control network element is forced to a predetermined state, in the absence of a fault condition.

20. A diagnostic and maintenance system, comprising:
a wireless diagnostic device, said wireless diagnostic device comprising a transmitter and receiver for communicating over a wireless communication channel with a control network via a control network wireless interface;

diagnostic devices programmed to perform at least one diagnosis or test function relating to said one or more control networks; and

at least one wireless ground station, said at least one wireless ground station comprising a ground station receiver attuned to said wireless communication channels, whereby transmitted messages between said wireless diagnostic devices and said one or more control networks over said wireless communication channels are monitored.

28. The diagnostic and maintenance system of claim 27, further comprising a ground station interface connected to said at least one wireless ground stations, and a local area computer network connected to said ground station interface, said local area computer network comprising one or more user terminals, said one or more user terminals each comprising a screen display whereby information relating to said transmitted messages may be displayed.

29. The diagnostic and maintenance system of claim 28, further comprising a memory storage device connected to said local area computer network, for storing transmitted messages monitored by said at least one wireless ground station over said wireless communication channels.

30. The diagnostic and maintenance system of claim 28, whereby instructions regarding diagnostic or test procedures are transmitted by said at least one ground station

over said wireless communication channels in response to commands entered via said user terminals.

31. The diagnostic and maintenance system of claim 28, whereby an instruction
5 to terminate a diagnostic session is transmitted by said at least one ground station over a selected one of said wireless communication channels in response to a command entered via one of said user terminals.

32. The system of claim 28, further comprising a diagnostic and maintenance
10 information database connected to said local area computer network, whereby information relating to said one or more control networks may be retrieved in response to a remote request received from any of said wireless diagnostic devices.

33. The system of claim 32, wherein said information relating to said control
15 network comprises graphical information relating to a control network, said graphical information being displayed on a screen display at the requesting wireless diagnostic device.

34. The diagnostic and maintenance system of claim 27, wherein each of said
20 wireless diagnostic devices is portable.

35. The diagnostic and maintenance system of claim 34, wherein each of said wireless diagnostic devices comprises a graphical display device connected to a wireless intermediary unit, said wireless intermediary unit containing said transmitter and receiver for communicating with said one or more control networks over a selected one of said wireless communication channels.

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